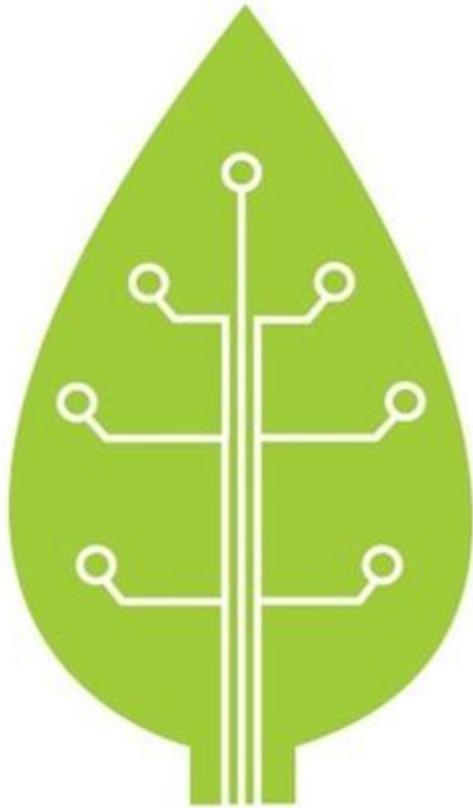


Artificial Leaf Solar Power | Artificial Leaf Produce Electricity



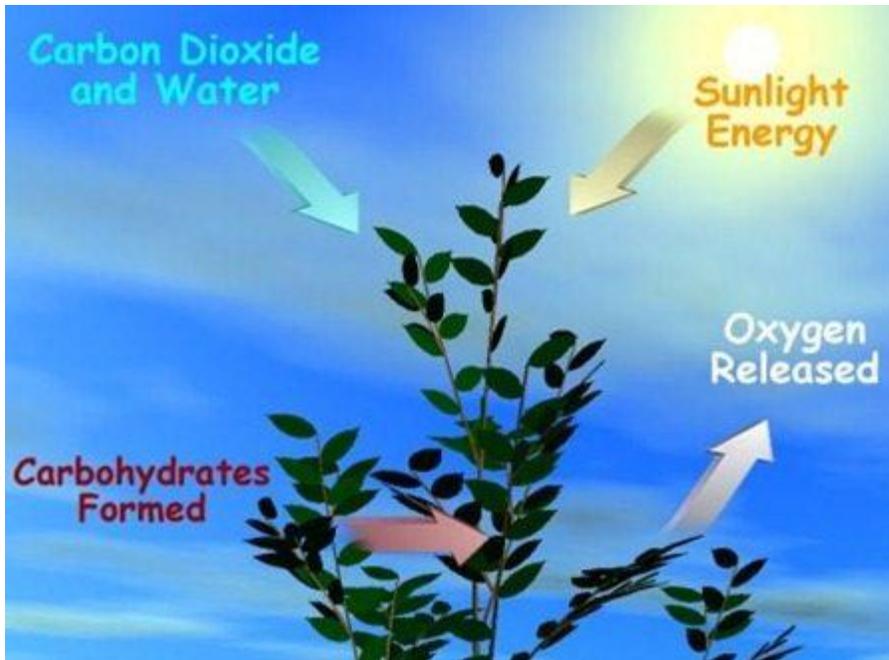
Photosynthesis:

Photosynthesis is the process by which plants, some bacteria, and some protists use the energy from sunlight to produce sugar, which cellular respiration converts into ATP, the “fuel” used by all living things. The conversion of unusable sunlight energy into usable chemical energy, is associated with the actions of the green pigment chlorophyll.

They release molecular oxygen and remove CO₂ (Carbon Dioxide) from the air.

ATP: Adenosine Tri-Phosphate (ATP) Here the energy is stored in living systems; it consists of a Nucleotide (with Ribose sugar) with Three Phosphate groups.

Why is photosynthesis important:



Nearly all living things depend on the energy produced from photosynthesis for their nourishment. Animals need the plants for food as well as oxygen. Only green plants are able to change light energy into chemical energy stored in food, thus they are vital to life on Earth.

Solar cells:



Conventional solar cells are also called as Photo Voltaic Cells. These cells are made out of semiconducting material, usually silicon. When light hits the cells, they absorb energy through photons. This absorbed energy knocks out electrons in the silicon, allowing them to flow. By adding different impurities to the silicon such as phosphorus or boron, an electric field can be established. This electric field acts as a diode, because it only allows electrons to flow in one direction. Consequently, the end result is a current of electrons, better known to us as electricity.

Drawbacks of Solar cells:

They can only achieve efficiencies around 10% and they are expensive to manufacture. The first drawback, inefficiency, is almost unavoidable with silicon cells. This is because the incoming photons, or light, must have the right energy, called the band gap energy, to knock out an electron. If the photon has less energy than the band gap energy then it will pass through. If it has more energy than the band gap, then that extra energy will be wasted as heat.

Artificial Leaf:

Mixing of Photosynthesis + Conventional Solar Cells + Hydrogen Fuel Cell



This Leaf device combines a commercially available solar cell (Silicon) with a pair of inexpensive catalysts made of Cobalt and Nickel that split water into Oxygen and Hydrogen. The hydrogen can be stored and used as an energy source. (For example to power a fuel cell).

The collection and storage of the sun's energy as hydrogen fuel is a key step in overcoming one of the limitations of solar power — it generates energy when the sun is shining, but it needs to be stored somewhere to be useful at night and in cloudy weather. Batteries are one place to store the energy, but it is limited. Storing solar energy as hydrogen fuel could be an answer for producing the electricity continuously.



Using this approach, a solar panel roughly one square meter bathed in water could produce enough hydrogen to supply electricity for a house.

Source:

<http://www.mechanicalengineeringblog.com/category/renewable-energy/artificial-leaf/>